What is Claimed is:

- 1 1. A bonding structure with a buffer layer, comprising:
- 2 a first substrate;
- a plurality of metal pads on a surface of said first substrate;
- 4 a protection layer covering on said surface of said first substrate;
- a first adhesive metal layer being formed on said plural of metal pads;
- a buffer layer being coated on said protection layer and said plural of metal pads;
- 7 a first metal layer covering said buffer layer;
- 8 a second substrate having a plurality of electrodes thereon; and
- a bonding layer, said bonding layer and said plural of electrodes being independently
- distributed on said second substrate;
- wherein said first metal layer, said plural of electrodes and said bonding layer are
- bonded directly to complete said bonding structure.
- 1 2. The bonding structure as claimed in claim 1, wherein said bonding is direct bonding.
- 1 3. The bonding structure as claimed in claim 1, wherein said electrodes on said second
- 2 substrate are respectively aligned to said plurality of metal pads on said surface of
- 3 said first substrate.
- 4. The bonding structure as claimed in claim 1, wherein said buffer layer coated on said
- 2 plurality of metal pads and said buffer layer on said protection layer are
- 3 independently distributed.

- 1 5. The bonding structure as claimed in claim 1, wherein said buffer layer coated on said
- 2 plurality of metal pads and said buffer layer on said protection layer are connected.
- 1 6. The bonding structure as claimed in claim 1, wherein said first substrate is a silicone
- 2 substrate.
- 1 7. The bonding structure as claimed in claim 1, wherein said second substrate is one of
- 2 glass substrate, polymer substrate, silicone substrate or ceramic substrate.
- 1 8. The bonding structure as claimed in claim 1, wherein the material for said first metal
- 2 layer is chosen from one of gold, aluminum or copper.
- 1 9. The bonding structure as claimed in claim 1, wherein the material for said buffer
- 2 layer is polymer.
- 1 10. The bonding structure as claimed in claim 1, wherein under-fill is further applied
- 2 between said first substrate and said second substrate to increase the reliability of said
- 3 bonding structure.
- 1 11. The bonding structure as claimed in claim 1, wherein the buffer layer on said first
- 2 adhesive metal layer and on said metal pads is separated, said first metal layer
- directly covers on and around said separated buffer layer and on said first adhesive
- 4 metal layer located between said separated buffer layer.
- 1 12. The bonding structure as claimed in claim 1, wherein said first metal layer directly
- 2 covers on and around said buffer layer, and contacts with said first adhesive metal
- 3 layer.
- 1 13. The bonding structure as claimed in claim 1, wherein the buffer layer on said first
- 2 adhesive metal layer and on said metal pads is separated, an electroplating metal is

- 3 electroplated to fill the hollow made by said separated buffer layer, said first metal
- 4 layer directly covers on said electroplating metal and on and around said buffer layer,
- 5 and contacts with said first adhesive metal layer.
- 1 14. The bonding structure as claimed in claim 3, wherein a second metal layer is formed
- 2 on said bonding layer located on said second substrate.
- 15. The bonding structure as claimed in claim 3, wherein a second metal layer is formed
- on said plurality of electrodes and on said bonding layer located on said second
- 3 substrate.
- 1 16. The bonding structure as claimed in claim 4, wherein a second metal layer is formed
- 2 on said bonding layer located on said second substrate.
- 1 17. The bonding structure as claimed in claim 4, wherein a second metal layer is formed
- on said plural of electrodes and on said bonding layer located on said second substrate.
- 1 18. The bonding structure as claimed in claim 11, wherein an adhesive layer is formed
- 2 between said first metal layer and said buffer layer.
- 1 19. The bonding structure as claimed in claim 12, wherein an adhesive layer is formed
- 2 between said first metal layer and said buffer layer.
- 1 20. The bonding structure as claimed in claim 13, wherein an adhesive layer is formed
- 2 between said first metal layer and said buffer layer.
- 1 21. A bonding method for a bonding structure with a buffer layer, comprises the steps of:
- 2 (a) forming said bonding structure with a buffer layer, including providing a first
- 3 substrate with metal pads thereon, covering a protection layer, forming a first
- 4 adhesive metal layer, coating a buffer layer, covering a first metal layer, providing

- 5 a second substrate with electrodes and an independently distributed bonding layer
- 6 thereon; and
- 7 (b) bonding together the surface of said first metal layer of said bonding structure,
- 8 said bonding layer on said second substrate and the surface of said metal pads.
- 1 22. The bonding method as claimed in claim 21, wherein the bonding method of said step
- 2 (b) is direct bonding.
- 1 23. The bonding method as claimed in claim 22, wherein said direct bonding is
- 2 performed through surface activation.
- 1 24. The bonding method as claimed in claim 22, wherein said direct bonding is
- 2 performed through surface activation plus heat pressure.
- 1 25. The bonding method as claimed in claim 22, wherein said direct bonding is
- 2 performed through heat pressure directly.
- 1 26. The bonding method as claimed in claim 23, wherein said surface activation is done
- 2 by bombarding using physical property of plasma to remove particles and oxide
- 3 contaminants on the surfaces of said first metal layer, said bonding layer and said
- 4 electrodes.
- 1 27. The bonding method as claimed in claim 23, wherein said surface activation is done
- 2 by exposing to ultraviolet ray to remove particles and oxide contaminants on the
- 3 surfaces of said first metal layer, said bonding layer and said electrodes.
- 1 28. The bonding method as claimed in claim 23, wherein said surface activation is done
- 2 by cleaning with chemical compound to remove particles and oxide contaminants on
- 3 the surfaces of said first metal layer, said bonding layer and said electrodes.

- 1 29. The bonding method as claimed in claim 21, wherein under-fill is further applied
- 2 between said first substrate and said second substrate to increase the reliability of said
- 3 bonding structure in said step (b).